Management of combined arterial and venous insufficiency

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Raghu Kolluri, MD: Disclosures

• Consultant/Advisor/ DSMB/ CEC -
  • Abbott, Auxetics, Boston Scientific, Diachii Sankyo, Koya Medical, Medtronic, NAMSA, Penumbra, Philips, PERC, Surmodics, USA Therm, VB Devices

• Board of Trustee
  • The VIVA Foundation
  • The Society for Vascular Medicine
  • American Vein and Lymphatic Society
  • Intersocietal Accreditation Council | Vascular Testing

• President
  • Syntropic Core Lab
Patient

• 72 yo male with limited mobility and Hx of PAD and Left SFA angioplasty (3 years ago) comes in with a superficial thrombophlebitic area turned into an open painful ulceration

• PMH : Diabetes, PAD, HTN no hx of DVT

• Ultrasound: patent deep veins, large varicosities, and GSV/SFJ reflux, calf area GSV with age indeterminate thrombosis + tributary vein thrombosis

• ABI’s
  • Right ABI -0.86 & Left - 0.4 – PVRs severe PAD
  • Duplex – Left SFA occluded, Low resistive signal in the CFA
Mixed Arterial Venous Ulcers
Pre Intervention Angiogram
Multi level disease
Epidemiology

• Incidence of arterial insufficiency (ABI<0.9) in venous ulcers: 15-30%.
  • Moderate: 13%
  • Severe: 2%

Dilemma

• To compress or to not? If I do, should the graduated pressure be same or not? What type of compression?
• To compress first or to revascularize the PAD?

Marston W. Wounds. 2011;23(12):351-356
The Diagnosis

Mixed arterial/venous ulcers

Moderate arterial and venous
33

Severe arterial and venous
13

ABI < 0.85

ABI < 0.5

Modified compression
21

Failed modified compression
12

Arteriography
5

No
8

Arteriography
9

Angioplasty
1

Arterial bypass
7

Angioplasty
3

Arterial bypass
3

Non-reconstructable arterial disease
4

+ Venous surgery
2

+ Venous surgery
1

Group I – ABI > 0.85
Group II – ABI < 0.85
Group III – ABI < 0.5

Management of mixed arterial and venous leg ulcers


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- Legs without arterial disease ABI >0.85 treated with multilayer compression
- Legs with severe disease ABI <0.5 considered for immediate revascularization
- Moderate arterial disease ABI 0.5-0.85 initially treated with compression and considered for revascularization if not healed

Br J Surg. 2007 Sep;94(9):1104-7
Results

• % healed at 36 weeks
  • No arterial disease
    • 86.8%
  • Moderate PAD
    • 67.6%
  • Severe PAD
    • 53% (P<0.001)

Combined 30-day mortality 6.5%

Br J Surg. 2007 Sep;94(9):1104-7
The effect of revascularization procedures on healing of mixed arterial and venous leg ulcers.

- 20 patients (ABI<0.75) treated with compression first, and revascularization if <0.5
- Healing time in patients treated with revascularization - significantly lower (16.6±2.6 weeks vs. 24.7±3.2 weeks, P<0.001)
- No significant difference in recurrences

Bottom line

• ARTERIAL REVASCULARIZATION HELPS WITH WOUND HEALING IN THE MIXED AV ULCERS.

• VENOUS ULCERS WITH MODERATE TO SEVERE PAD SHOULD BE TREATED AS ISCHEMIC ULCERS.

• CAUTION – SMALL STUDIES!
Final Results

Venous Ulcer healed in 2 months
### Hemodynamic effects of intermittent pneumatic compression in patients with critical limb ischemia

Nicolas Leporello, PhD, DCC, RVT, Louis R. Leon, Jr, MD, RVT, Ahmed Bhatti, MD, RVT, Steven Melton, MD, Steven S. Kang, MD, Ashraf M. Mansour, MD, and Marc Berge, MD, *Mayo Clinic, Rochester, MN*

**Background** Traditional teaching assumes that the distal arterial tree is maximally dilated in patients with critical limb ischemia (CLI). Endovascular or arterial bypass procedures are the commonly used interventions to increase distal perfusion. However, other forms of treatment such as spinal or external stimulation or intermittent pneumatic compression (IPC) have been shown to improve limb salvage rates. This prospective study was designed to determine if the use of IPC increased perfusion, gait, muscular, collateral arterial, and skin blood flow in patients with CLI.

**Methods** Twenty limbs with CLI in 20 patients (mean age, 74 years) were evaluated with duplex ultrasound scans and laser Doppler fluximetry in the semi-supine position before, during, and after IPC. One pneumatic cuff was applied on the foot and the other on the calf. The maximum inflation pressure was 125 mm Hg and was applied for 3 minutes at three cycles per minute. All patients had at least two-level disease by arteriography. Forty-two limbs were randomized to control group, and six were randomized to IPC group. Five additional studies were performed in the placebo and the control group. Flow volumes were measured in the popliteal, tibial, muscular, and a translucent collateral artery. Skin blood flux was measured on the dorsum of the foot at the same time. 

**Results** Significant flow increase during the application of IPC was found in all three arteries (16/20 limbs) compared with baseline values (*P* < 0.05). The highest change was seen in the popliteal, followed by the muscular and the collateral artery. After the conclusion of IPC, the flow returned to baseline levels. This was attributed to the deviation of flow from the muscular artery, as the diameter of the arteries remained unchanged. The skin blood flux increased significantly as well (*P* < 0.05). In the two limbs without an increase in the arterial or skin blood flow, significant augmentation of flux was found. Both limbs were amputated shortly after.

Conclusions IPC increases muscle, muscular, and skin blood flow in patients with CLII and may be beneficial to those who are not candidates for revascularization. Patients with significant venous reflux may not benefit from IPC. This suggests that one of the mechanisms by which IPC enhances flow is by increasing the arteriosclerosis pressure gradient.


### Review Articles

**Systematic review and meta-analysis of high-pressure intermittent limb compression for the treatment of intermittent claudication**

Lawrence Oemegaa, MD, Michael Mazzee, MD, MS, Bijay Basham, MD, Aisho Farooqui, MD, Caran Jaffar, MD, Stephenie Roth, MUSC, Eric T. Choi, MD, and Paul van Beers, MD, *Mayo Clinic, Rochester, MN and New York, NY*

**ABSTRACT** High-pressure intermittent limb compression (HIPC) has been proposed as an alternative treatment of disabling intermittent claudication. The objective of this study was to conduct a systematic review and meta-analysis of randomized controlled trials evaluating the efficacy of HIPC in improving walking distance in patients with intermittent claudication.

**Methods** A search through December 31, 2016, was performed to identify all randomized controlled trials evaluating the efficacy of HIPC for the management of intermittent claudication. Applicability studies were assessed for quality and pooled using Cochrane systematic review guidelines. The primary outcome measure was absolute claudication distance (ACD). A random-effects model was used for meta-analysis.

**Results** Eight studies eligible for inclusion were identified. These studies had a combined total of 291 subjects, 172 of whom were randomized to HIPC. All studies identified an increase in walking distance for subjects receiving compression therapy. On meta-analysis, the mean difference of ACD from baseline to follow-up among subjects receiving compression compared with controls was 125 m (95% confidence interval, 53.58-196.85 m; *P* < 0.01).

**Conclusions** HIPC is associated with a significant increase in ACD compared with controls. Limit compression appears to be an effective, noninvasive treatment option for patients with intermittent claudication. However, there are few studies comparing limb compression with other commonly used therapies. Further studies are needed to better guide the use of HIPC in the treatment of claudication.

At primary surgery, 20% to 40% of patients lack suitably sized GSV


In CLI

3.0 to 3.5 mm carry a 1.5-fold risk for primary failure compared with grafts > 3.5 mm.


CONCLUSIONS

Among patients with CLTI who had an adequate great saphenous vein for surgical revascularization (cohort 1), the incidence of a major adverse limb event or death was significantly lower in the surgical group than in the endovascular group. Among the patients who lacked an adequate saphenous vein conduit (cohort 2), the outcomes in the two groups were similar. (Funded by the National Heart, Lung, and Blood Institute; BEST-CLI ClinicalTrials.gov number, NCT02060630.)
So, what is the maximum acceptable diameter of the GSV for an adequate conduit?

How do we properly map the veins?

Timing of the vein mapping?
Mixed etiology ulcer

ABIs +/- duplex AND venous reflux test

ABIs Normal or >0.8
- 2-4 layered compression wraps
- Wound care
- **Endovenous therapies**

ABIs - Moderate PAD
- Gently applied 2-4 layered compression wraps
- Wound care
- **Educate pts and family**
- +/- Endovenous therapies

Ulcer Healed

PREVENT ULCERS BY GRADUATED COMPRESSION SOCKS

ABIs - Severe PAD
- Angiography and revascular if possible
- Revascularized
- No option

Modified gentle compression + Leg elevation
- +/- Arterial flow device/vein pump/lymphedema pump
- Close weekly monitoring
- Prevent infection
Summary

• Revascularize if mod to severe PAD
• Mild to mod → Modified compression wraps
• Spare saphenous vein unless large and unsuitable for bypass graft
• May need to think outside the box and be creative – re compression therapy
• These are sick/fragile patients – Do least harm
• Pneumatic compression devices are very helpful
• Collaborate if not comfortable